New York Water Science Center, Strategic Science Plan, 2005-2010:

WATER AVAILABILITY AND SUSTAINABILITY

Background and Societal Relevance

New York is a relatively water-rich state, and historically, its water-resources have been considered adequate to meet needs. Locally, however, increasing water use may be exceeding the sustainable yield of supplies. Also, drought can lead to short-term water shortages both locally and statewide, as was last experienced in 2001 and 2002. New questions are being raised about competing water needs as, for example, population and development increases, contamination restricts the use of some water supplies, new competing human and ecological needs are identified, and water needs for waste assimilation continue to increase.

> Water-use data, combined with other USGS information, have facilitated a unique understanding of the effects of human activity on the Nation's water resources. As water availability continues to emerge as an important issue in the 21st century, the need for consistent, long-term water-use data will increase to support wise use of this essential natural resource.
>
> Robert M. Hirsch
> USGS Associate Director for Water

Reliable, accurate, and timely information is required to properly manage New York's water resources and ensure safe and sustainable water supplies across the state. The USGS conducts data collection and scientific studies that directly and indirectly address the issues of water availability and use. In particular, the USGS, as part of its National Water-Use Information Program, works in cooperation with local, State, and Federal environmental agencies to collect water-use information. USGS also compiles the data from hundreds of thousands of sites to produce water-use information aggregated at the county, state, and national levels. Every five years, data at the state level are compiled into a national water-use data system and are published in a national circular. Figure 1 shows water use in New York for 2000.

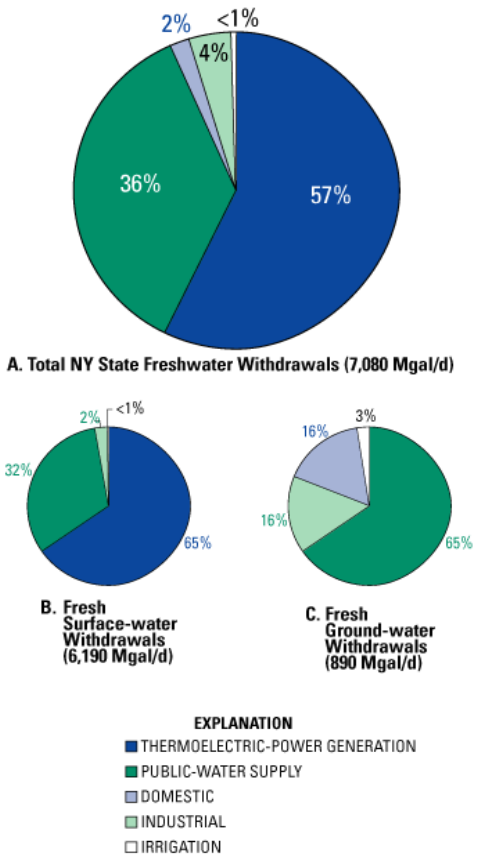

Figure 1. – Freshwater use in New York State in 2000.

The USGS hydrologic monitoring program, commonly referred to as the data program, is critical to addressing questions concerning water availability and sustainability. The data program in New York provides data on real-time hydrologic conditions as well as historical data. For information see the Strategic Science

Plan for Hydrologic Systems, Surveillance, and Hazards developed by the USGS New York Water Science Center.

The sustainability of New York's water supply will depend largely on the ability of the State to protect its water resources from contamination. Therefore, many USGS studies, which address environmental-quality issues and are discussed in a separate section of this plan, indirectly address the issue of water availability. In many urban areas, surface water and shallow ground water have been contaminated, which increases the cost of using these resources for water supply, or precludes their use entirely. Ground water protection is a concern because of the time and money required to remediate contaminated aquifers. It's a particular concern on Long Island; the aquifers underlying the Island are the sole source of water supply for the approximately 2.8 million residents of Nassau and Suffolk Counties. Some public-supply wells on Long Island have been closed because of contamination from the land surface, and in areas near the shoreline, wells have been closed because pumping has caused saltwater intrusion.

Stratified-drift aquifers are important sources of ground water in upstate New York. The extent and characteristics of many aquifers have not been fully evaluated in all areas. Therefore, the potential of the aquifers as water supplies and their vulnerability to contamination is not fully understood. As suburban development spreads into rural areas and more people draw on bedrock aquifers, the sustainable yield of the aquifers is becoming a subject of increasing importance.

New York City contains about half of the state's population, and the size and location of New York City creates some unique water-supply issues. The City must draw on a considerable area to supply water to about 9 million people and transport that water as much as 125 miles to reach Manhattan. The watersheds that supply the City cover about 1,970 square miles and are home to more than 250,000 people in 73 communities. The infrastructure required to move the water from the watersheds to the City, particularly large underground tunnels and aqueducts, presents a set of geohydrologic and geotechnical issues not typical of most water-supply systems.

Figure 2. – Aerial photograph of the Neversink Watershed & Reservoir, whose capacity is about 6% of New York City's total water-supply system.

Program Plans, Goals, and Actions

In early 2005 the New York Water Science Center (the Center or WSC) conducted a planning exercise to gather information and ideas from within and outside the USGS to help formulate a Strategic Science Plan for the next five years. The following paragraphs incorporate key ideas from that exercise.

- The USGS, with participation of cooperating agencies, will regularly review and analyze the surface-water monitoring network to ensure that the network is continuing to address cooperator needs and at the same time is fulfilling the USGS mission. A small percentage of important surface-water gages do not have satellite telemetry. The New York WSC will work towards installing the satellite telemetry and providing data in near-real-time from the relatively small number of sites that don't have this capability.

- Similarly, the USGS, with participation of cooperating agencies, will regularly review and analyze the ground-water monitoring networks to ensure that the program addresses cooperator needs and at the same time is fulfilling the USGS mission. With this goal in mind, the Center will work towards expanding the ground-water-level monitoring network in Upstate New York and add real-time telemetry to more wells as funding permits. Ground-water data on Long Island is particularly important to the management and protection of the resource. The Center will work to rebuild the basic data program in Nassau County. Water-level data from Kings, Queens, Nassau, and Suffolk Counties will be collected, and water-level maps of Long Island regularly published.

- The New York WSC will maintain a strong water-use program in New York and strive to provide water-use data in formats and categories most needed by cooperators. The Center will pursue opportunities to build on the national USGS water-availability and use initiative to develop new projects, focusing in the near term on the Great Lakes basin.

- The USGS will conduct data collection and hydrologic studies in New York City that provide for the evaluation of various water management alternatives. The ground-water system under Brooklyn and Queens will remain a focus of this work, but ground-water resources on Staten Island also will be included. The Center will continue to provide geophysical logging for the New York City water-tunnel program and will incorporate new techniques, such as cross-hole tomography, into the program where possible.

- The Center will work with the communities on Long Island to expand programs that provide for better management of the resource, particularly by better characterizing the hydrogeologic framework of selected areas of the Island. The Center will continue to work with state and county cooperators to map and characterize Upstate aquifer systems. The need to include important bedrock aquifers in this program will be stressed. Better defining the water budget of ground-water systems will be particularly important in some areas experiencing growing water demands.

- Water managers need to better understand and define competing ecological and human water needs if water resources are to be properly managed. The USGS will work with cooperators to fill this need by conducting studies to evaluate, for example, how effectively water releases and regulated streamflow mimic natural processes and affect ecosystems, and how ground-water withdrawals affect streamflow and wetlands. On larger scale, there is a need to evaluate the possible effects of climate change on water quantity.

The above are some of the principal plans and goals of the New York WSC in the program area of water availability and use. A brief description of all projects currently being conducted by the WSC can be found on the web at http://ny.usgs.gov. If you would like to discuss any of the topics listed above, make additional suggestions, or learn more about the USGS in New York, please contact:

Rafael W. Rodriguez,
Director, New York Water Science Center,
(518) 285-5659,
email: dc_ny@usgs.gov